NOTES ON THE SYSTEMATY AND DISTRIBUTION OF MALAYAN PHANEROGAMS, II

The Jack and the Chempedak

By E. J. H. CORNER,
Botanic Gardens, Singapore

	Page
INTRODUCTION	56
ACKNOWLEDGEMENTS	57
PART I, DESCRIPTION—	
Characters common to the Jack, Chempedak and Wild Chempedak	58
Distinctions between the Jack, Chempedak and Wild Chempedak	59
Conclusion	66
PART II, SYSTEMATY—	
The identification of *Artocarpus integer*	68
Synonyms of the Chempedak	71
Polyphema Champeden	73
The Wild Chempedak	75
Botanical names for the Jack	76
Varieties of the Jack	77
The confusion between Jack and Chempedak ..	79
Artocarpus integer as a *nomen specificum conservandum*	80
SUMMARY	81

Introduction

Throughout the Malayan region, from Sumatra to New Guinea, there are two common village-trees that are called in Malay "nangka" and "chempedak". The first is better known as the Jack (from its Indian name "jaka") : for the other we must at present borrow from the Malay because there is no alternative. In Malaya we have also a wild form of Chempedak that is scattered in the high forest throughout the mainland from the lowlands to an altitude of 4,000 ft.: it is called "bangkong" or, in Johore, "barok" but only the first is well-known and that only in the middle of the country. I shall refer to it as the Wild Chempedak. Now I use these vernacular names purposely because, until these pages have been read, I do not see how anyone, be he botanist or not, European or Asiatic, can know what are the specific differences between the plants or what may be their botanical names. The best recent descriptions of them are those given by Bakhuizen van den Brink in Ochse's two books.* There are, however, about two dozen distinctions most of which have not been described and it

* Fruits and Fruit-Culture in the Dutch East Indies, *1931*, p. 67. Vegetables of the Dutch East Indies, *1931*, p. 486.

appears that a post-Linnean study of the Chempedak-fruit has never been made, leastways not published: indeed, for what one may read about it in botanical literature, the Chempedak may be likened to a Dodo. The most informative and authoritative descriptions are those on the "Nanka" and "Tsjampedaha" written by Rumphius in 1690 though not published until 1750 (Herb. Amboin. tom. I.) and that on the "Tsjakamaram" published by Governor Rheede in 1682 (Hort. Malab., III), though, being pre-Linnean, one would assign to them only a historical value. As for the Wild Chempedak, what is yet written concerning it is little more than the record. Since I began this investigation, however, I have been fortunate in finding a fruiting tree in the East of Johore, several such trees by the Tahan River in Pahang and one flowering and many sterile trees on Fraser's Hill, Pahang. I have thus been able to study the Wild Chempedak critically.

In the first part of this paper I have compared these plants as fully as possible and, in the second part, I have argued what must be their correct botanical names. As the results are somewhat momentous and I have no doubt that what I have discovered will not be acceptable to many, I have investigated the problem with the greatest care. For nearly 150 years the Jack has been called *Artocarpus integrifolia* Linn. f. but the name was changed recently to *A. integra* (Thunb.) Merrill without any reason. In checking the alteration, I found that the original descriptions of both names referred to the Chempedak and I can now add that the type-specimen of both is the Chempedak. The name *A. integra* or, correctly, *A. integer* which has been used in error for the Jack must now be given to the Chempedak and for the Jack one must resuscitate its earliest legitimate synonym which is *A. heterophylla* Lam. or, correctly, *A. heterophyllus*. It is evident that not merely has the botany of these common plants been neglected but no systematist has ever referred critically to the original description of *A. integer* or *A. integrifolia* and the type of both names has never been re-examined: oranges and lemons, as it were, have been confounded. For the Wild Chempedak I have made the new variety *A. integer* var. *silvestris*.

Acknowledgements

It has been through the goodness of Professor N. E. Svedelius, of the Botanical Institution of Uppsala, that I have been able to conclude this investigation, and I wish to record my sincere thanks for his assistance. Professor Svedelius discovered the type of *Rademachia integra* Thunbg. (the basinym of *A. integer* and *A. integrifolia*)

and compared with it specimens of Jack and Chempedak which I sent. The extent to which I am indebted to Prof. Svedelius can be seen from the extracts of his letters which he has allowed me to publish, as well as from the photographs of the type-specimen which he has supplied.

I also express my gratitude to Mr. J. W. Grant, Rice Research Officer in Burma, for his assistance in sending specimens of Jack from Burma; to the Deputy Director of Agriculture, Tenasserim Circle, Moulmein, and the Senior Agricultural Assistant, Mudon, Burma, for specimens of 'Sone-ka-dat' (Chempedak); to Mr. R. C. Broadfoot, Principal of the Agricultural College, Coimbatore, for specimens of Jack from Coimbatore; to Mr. G. Taylor, of the British Museum, for kindly enquiring into the original specimens of Loureiro's species of Polyphemia and for copies of descriptions not available in Singapore; and to Mr. C. X. Furtado, of the Singapore Botanic Gardens, for his guidance in the Rules of Botanical Nomenclature.

PART I, DESCRIPTION

Characters common to the Jack, Chempedak and Wild Chempedak

Large evergreen trees with dense, dark green, spreading crowns: *trunk* not or scarcely buttressed: *bark* greyish brown, dark, rough, uneven, somewhat scaly: *inner bark*, thick, ochraceous: *latex* white, copious, gummy: *wood* yellow: *young leaves* pale yellowish green: *sapling leaves* with 1–2 pairs of lobes.

Leaves alternate on the horizontal branches, spirally arranged on the ascending branches: *blade* 4–25 × 2–11.5 cm., thinly leathery, entire, tending to point upward and to have upcurled sides, base cuneate: *lateral veins* 5–12 pairs, arising at a wide angle and curving forward: reticulations minute: *petioles* 1–4 cm., long: *stipules* .7–8.5 cm. long.

Inflorescences cauliflorous and ramiflorous, on short leafy twigs, male and female on the same tree, the female at the base of the short twigs, the males from the subsequent leaf-axils: *male inflorescences* occasionally axillary on the ordinary twigs: pedunculate, hanging, with oblong, blunt heads; without bracts between the flowers.

Male flowers with a minute, tubular perianth with 2 lobed mouth: 1 stamen: fragrant.

Female flowers tubular, connate except at the base and apex, the apical part projecting as a 3–7–gonous, blunt or acute cone or pyramid traversed by the style.

Syncarps very large with copious pulp round the large "seeds": hanging from short, stout woody twigs on the

trunk and branches, solitary: the apex of the stalk more or less sunk into the head.

Seeds with more or less unequal cotyledons: varying 2–3.3 cm. long × 1.1–2.3 cm. wide: germination 'subepigeal', with very short hypocotyl and long epicotyl bearing several scale-leaves before the first foliage-leaves, the cotyledons spreading at soil-level and turning deep green.

Distinctions between the Jack, Chempedak and Wild Chempedak

(living plants)

1. Hairiness

Jack.—All parts glabrous or with minute, white hairs up to .5 mm. long, the tips breaking off and the bases giving the slight scabrid feel to the leaves and twigs.

Chempedak.—Leaf twigs, petioles, stipules, the veins on the underside of the leaf and the stalks of the flower- and fruit-heads, set with long, wiry, spreading, pale to dark brown hairs, 1–7 mm. long: the male flower-heads occasionally with glabrous stalks. (It is possible that there are glabrous varieties of Chempedak in India, *vide infra* "Varieties of Jack").

Wild Chempedak.—Varying (in different collections) from wholly glabrous like the Jack to hairy like the Chempedak.

Concerning the variability of the Wild Chempedak it is impossible, at present, to say whether there are glabrous, hairy and slightly hairy varieties or that these states merely indicate stages in the development of individuals, the oldest or biggest being glabrous. I am inclined to think that differences may be of both kinds for seedlings of a Wild Chempedak (S. F. No. 32988) that I raised had rather thickly set, short white hairs, though the parent tree was glabrous.

2. Colour of Leaf-Blade

Jack.—Very dark shiny green, or blackish green, on the upperside; the midrib and main veins greenish white to pale greenish yellow: old leaves withering orange-ochre to brown-ochre.

Chempedak.—Rather dull middle-green, or even slightly yellowish especially on the underside, much paler than the Jack: the midrib pale greenish yellow to greenish ochre: withering as the Jack.

Wild Chempedak.—As the Chempedak but the midrib distinctly ochre on both sides, commonly ochre-brown on the underside: withering green or slightly yellowish green

or dingy yellowish, then turning dry and brown, never rich ochre or orange.

From the colour of the leaf, one can distinguish the Jack from the Chempedak at a distance. The absence of "autumn tints" in the Wild Chempedak is curious: I have checked it from many trees.

3. Shape of Leaf-Blade

Jack.—Elliptic-obovate to obovate, shortly and bluntly sub-acuminate: base tapered cuneate and decurrent on the petiole (Text-Fig. 1).

Chempedak.—Elliptic to narrowly elliptic-obovate, distinctly acuminate: base cuneate, abrupt, not decurrent (Text-Fig. 1).

Wild Chempedak.—Narrowly elliptic, otherwise as the Chempedak.

The character of the leaf-base enables one to distinguish at once between the dried leaves of Jack and Chempedak.

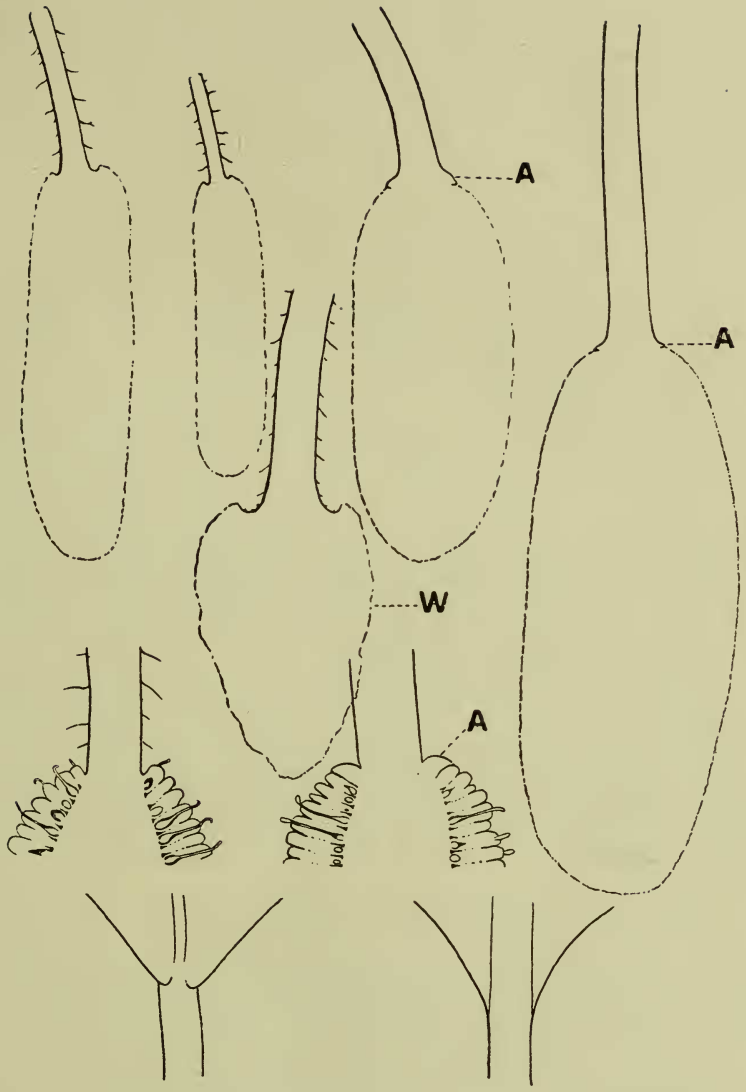
4. Male Inflorescences

Jack.—Peduncles stout, 1½–5 cm. long, 4–5 mm. wide: head ellipsoid, dark green, 3–7 cm. long × 2–2.8 cm. wide, with a dark green annulus, 1½–2½ mm. broad, at the base. Flowers smelling of honey and bananas: perianth 1–1.5 mm. high, slightly hairy: stamen 1.5–2 mm. high. (Text-Figs. 1, 2).

Chempedak.—Peduncles slender, 2–3 mm. wide, often verruculose: head cylindric, smaller, pale green to yellowish, 3–5.3 × .9–1.2 cm., with a minute furrow at the base but no annulus: flowers smelling of honey and burnt-sugar, stronger, toffee-like: perianth smaller and densely hairy, .7–1 mm. high: stamen smaller and slenderer, 1–1.3 mm. long. (Text-Figs. 1, 2).

Wild Chempedak.—Peduncles 4–6 mm. wide, stout, dilated at the apex: head conical with a broad furrow at the base (but no annulus), the apex blunt, the surface rugose, 3–4.5 × 2–2.5 cm., light green, very faintly honey-sweet: perianth 1–1.5 mm. high: stamen 1.7–2.4 mm. long (Text-Fig. 1).

The shape of the male inflorescence in the Wild Chempedak seems to be distinctive but I have seen only five inflorescences, two fresh and three nearly rotten, from one tree on Fraser's Hill. The difference from the cultivated Chempedak is surprising and shows how dangerous it is to extrapolate to other features from a partial similarity when studying tropical plants.



TEXT-FIG. 1.

Jack (to the right) and **Chempedak** (to the left): nat. size. Longitudinal sections of the male inflorescences and of the base of the female inflorescences at anthesis: *below*, the upperside of the junction of lamina and petiole: A, the annulus of the **Jack**: W, the male inflorescence of the **Wild Chempedak** in longitudinal section (S. F. No. 33205).

5. Female Inflorescences

Jack.—Peduncles stout, 8–9 mm. wide: heads ellipsoid dark green, with a stout green annulus, 3–4.5 mm. wide, at the base: style with the projecting apex spathulate or ligulate, slightly curved. (Text-Fig. 2).

Chempedak.—Peduncles not so wide, 6–7 mm.: heads cylindric, light yellowish green, with a slight furrow at the base but no annulus: style with the projecting apex filiform and often coiled. (Text-Fig. 2).

Wild Chempedak.—? As the Chempedak. (not known).

Both Jack and Chempedak seem to be insect-pollinated in contrast with the Bread-fruit tree, the Tĕrap (*A. elasticus*), and the Monkey-Jack (*A. rigidus*) which appear to be wind-pollinated, their male inflorescences emitting clouds of pollen when tapped or swung.

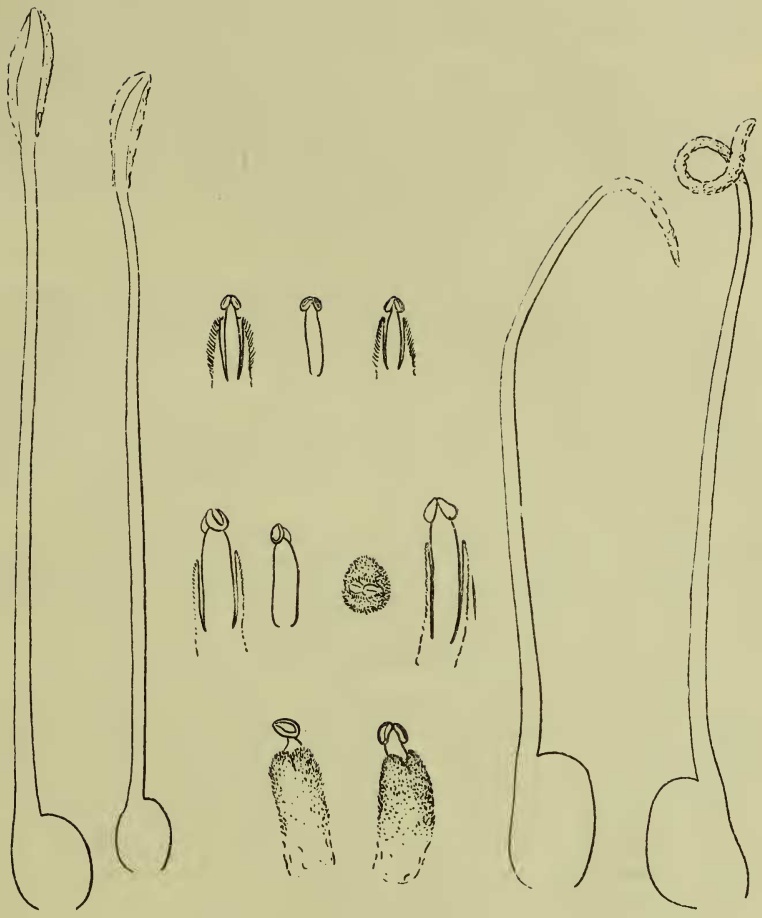
The morphological nature of the annulus I have not been able to discover. It is most characteristic of the Jack, its homologue in the Chempedak being a few minute hairy scales just above (proximal from) the lowest flowers on the head. The scales may be interpreted as bracts or as sterile flowers, their structure being too rudimentary to decide. The annulus of the Jack is a glabrous, tumid ring with a very narrow, abrupt flange along the edge: it does not cover the head of flowers at any stage or even attempt to. The presence of the annulus places Lamarck's species *A. heterophylla* beyond question.

It should be remarked that the Jack produces its female heads mostly from the trunk and bases of the limbs whereas the Chempedak fruits more often on the limbs than on the trunk. Indian botanists have suggested that the Jack tends to be ramiflorous at first and to become cauliflorous with age, but in Malaya that is by no means necessarily the case. It is possible that two species are confused in India (*see* p. 77).

The Wild Chempedak is variable. The trees which I saw along the Tahan River in Pahang, seven in all, bore their fruits in bunches on the trunk, from a height of one foot above ground, and along the stouter parts of the main limbs, but a very big tree (130 ft. high) in the East of Johore had its fruits only on the branches without a trace of a cauline twig. I think the Wild Chempedak is, therefore, cauliflorous at first, becoming ramiflorous in old age.

6. Size, Shape, Colour and Smell of Ripe Syncarp (False Fruit, or Fruit-head)

Jack.—30–90 cm. long × 25–50 cm. wide, oblong ellipsoid to pyriform, cream to golden yellow, *with a sickly sweet smell* like ripe bananas, rather strong or faint.



TEXT-FIG. 2.

Flowers of the **Jack** and **Chempedak** at anthesis, x 10: *left,* 2 female flowers of the **Jack**: *right,* 2 female flowers of the **Chempedak**: *upper centre,* 2 male flowers (with the perianth cut open) and a stamen, of the **Chempedak**: *lower centre,* male flowers of the **Jack,** 2 with the perianth cut open, one in end-view and just opening.

Chempedak.—20–35 × 10–15 cm., oblong cylindric, often like a badly-stuffed stocking, cream yellow to ochre or brownish ochre, *with a strong, harsh, penetrating stench* (like durian and bachang, *Mangifera foetida*).

Wild Chempedak.—15–30 × 10–15.5 cm., oblong elliptic, often uneven, golden then light orange-ochre to orange brown, or golden brown, *without any smell.*

The absence of smell from the Wild Chempedak is curious. I have checked it in eight trees and the observation was confirmed by Malays who were well-acquainted with the 'Bangkong' in Pahang and whom I questioned purposely. The cultivated Chempedak has, perhaps, the strongest and richest smell of any fruit in creation.

7. Wall and Core of Ripe Syncarp

Jack.—Wall and core firmly attached to the "seeds" (mericarps, or true fruits), the "seeds" having to be cut out: spines conspicuous, 4–10 mm. long, pointed or blunt (according to the variety).

Chempedak.—Wall and core easily separable from the "seeds", parting of their own accord, the "seeds" falling out on cutting open the syncarp: spines slightly prominent, 2–4 mm. long, pointed.

Wild Chempedak.—As the Chempedak but the spines distinctly prominent, 3–5 mm. long, or not (2–3 mm. long).

The separation of the wall and core in the Chempedak gives the fruit its baggy appearance.

8. Edible Pulp of "Seeds" (Fruiting perianth)

Jack.—Waxy-firm, translucent, rather cartilaginous, golden yellow, thickened below the seed to form a stout stalk, giving the "seed" an oblong shape: with a sweet, sickly taste like sugared banana. (Text-Fig. 3).

Chempedak.—Creamy-custardy, easily squashed, opaque, cream to golden yellow, not thickened to form a stalk, the "seed" appearing short and dumpy: with a strong, sweet taste of durian and mango. (Text-Fig. 4).

Wild Chempedak.—As the Chempedak but with merely a slight sour-sweet taste and no smell.

The insipid pulp of the Wild Chempedak is known to Malays whose sole use for the fruit is to extract, boil and eat the seeds as they do those of the Jack. It is the stalk to the pulp of the Jack-seed that makes it longer than the Chempedak-seed. The firm pulp of the Jack-seed, with its patent lumen, is shown in Gaertner's figure of 1791.

9. "Seed" (True fruit, inside the fruiting perianth)

Jack.—Pericarp as a thick (1 mm.) subgelatinous pellicle, or jacket, round the true seed, attached by its whole base: persistent style string-like, .5 mm. wide, from the distal third of the pericarp. (Text-Fig. 3).

Chempedak.—Pericarp as a transparent membrane (.1 mm. thick), attached at one side of the base: persistent style thread-like, from the proximal third of the pericarp. (Text-Fig. 4).

Wild Chempedak.—As the Chempedak.

The presence of a "jacket" round the Jack-seed and its absence from the Chempedak are well-known to natives. The persistent style is so slender in the Chempedak and its wild variety that it can easily be overlooked. The position of the style is shown correctly in Gaertner's figure of the Jack.

10. SEED-PROPER (matured ovule)

Jack.—Mango-shaped, generally distinctly flattened in a plane parallel with the sagittal (*i.e.* the longitudinal plane through the hilum) : the hilum and micropyle in the distal third (near the radicular end of the seed) : testa pallid white, rather thick, tough, parchment like, crinkly when dry: inner seed-coat as a thin brownish membrane, thickened at the hilum.

Chempedak.—Plump, scarcely flattened: hilum and micropyle in the proximal third (near the end away from the radicle) : testa very thin, as a brownish membrane: inner seed-coat indistinguishable.

Wild Chempedak.—As the Chempedak, but the seed in some cases subcylindric. (Text-Fig. 5).

The tough testa of the Jack-seed is well-known to natives from the crinkling sound that it makes when the dry seed is rubbed between the fingers as well as from its power of protecting the dried Jack-seed. If the testa is intact the Jack-seeds will retain their power of germination for several months. The seeds of the Chempedak, with their membranous testa, have scarcely any power of dormancy and this difference doubtless explains why the Jack is far more widely distributed than the Chempedak. The seeds of the Wild Chempedak germinate in the fallen fruit before it is decayed.

11. EMBRYO (Kernel)

Jack.—With very unequal cotyledons, the one only 1/3–½ the length of the other: radicle superficial (the basal lobe of the smaller cotyledon being undeveloped). (Text-Fig. 3).

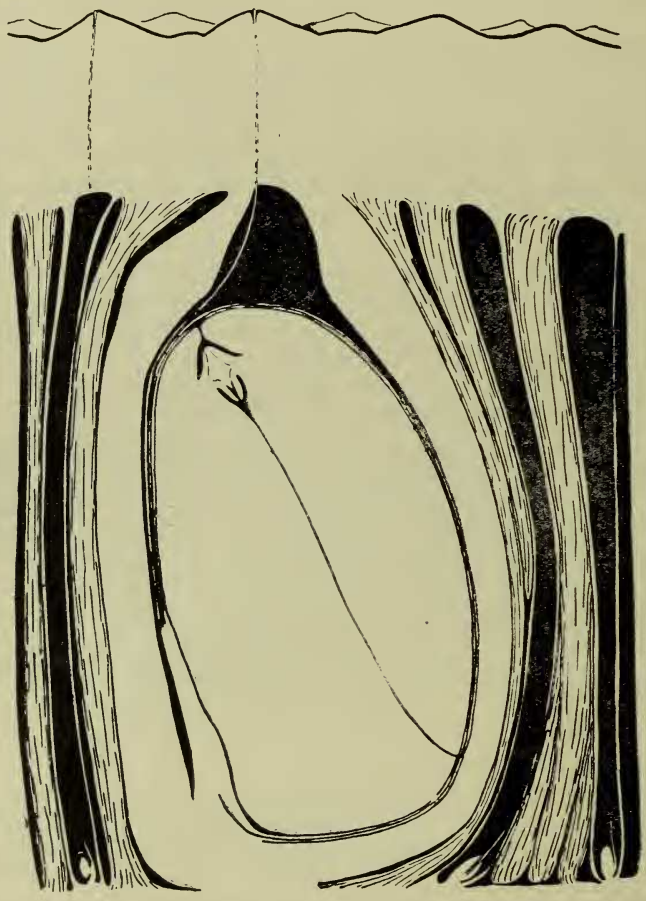
The Jack seems to have the most unequal cotyledons of any species of Artocarpus.

Chempedak.—Cotyledons less unequal, the one 2/3–3/4 the length of the other: radicle immersed (both cotyledons having basal lobes). (Text-Fig. 4).

Wild Chempedak.—As the Chempedak but the cotyledons often nearly equal. (Text-Fig. 5).

Conclusion concerning the Jack, the Chempedak and the Wild Chempedak

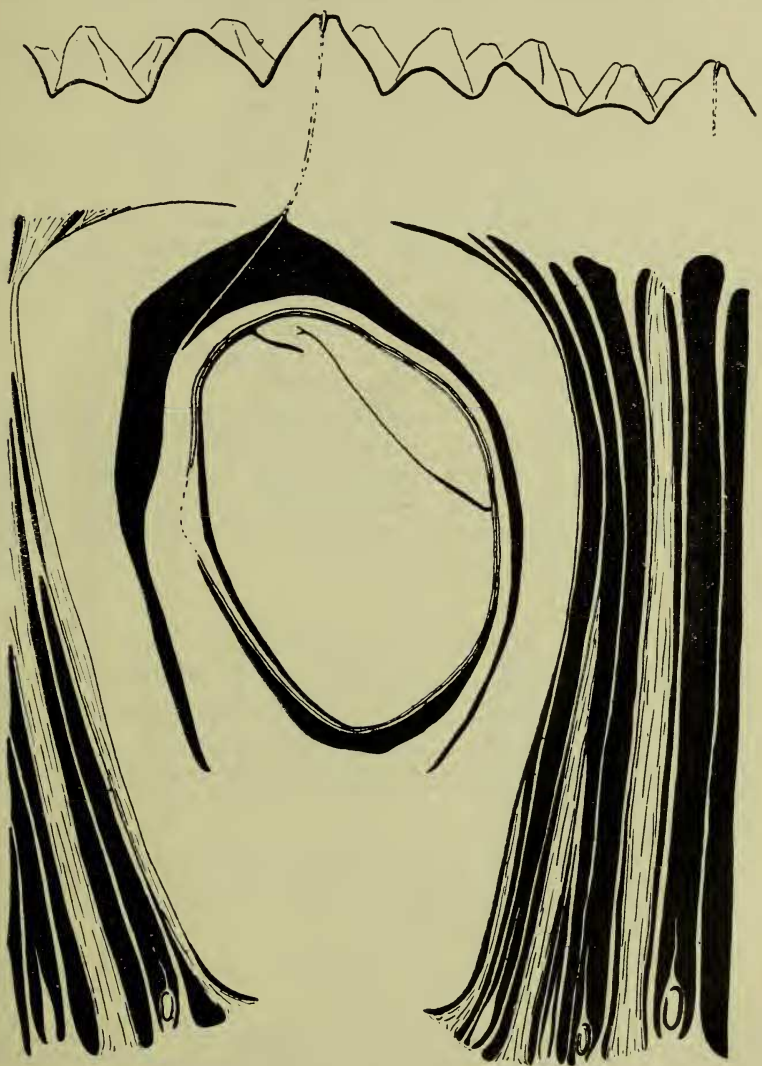
The Wild Chempedak is clearly conspecific with the cultivated Chempedak. It differs from the cultivated in its variable hairiness, its more oblong leaf without autumn tints, its more spiny, barrel-shaped syncarps without smell, its rather tasteless seeds and, apparently, its conical male



TEXT-FIG. 3.

Jack: longitudinal section through the ripe seed *in situ*, the spaces between the flowers, between the perianth-tube and ovary, and between the ovary-wall and ovule, or fruit-wall and seed, in black: x 2.

inflorescences with stouter stalks and larger stamens. Malays to whom I showed the fresh wild fruits in Singapore, after much deliberation, declared them to be a new idea the "Nangka-Chempedak", so impressed were they by their shape and absence of smell, as well as by the hairlessness of the twigs. Botanically however, such resemblances with the Jack are trifling, and perhaps insignificant, when



TEXT-FIG. 4.
Chempedak: as Text Fig. 3, x 2.

figures transposed

weighed against the exact similarity with the Chempedak in structure of leaf-blade, fruit and seed.

The main specific differences between the Jack and Chempedak (now in its widest sense of the cultivated and wild forms) concern—

1. the shape of the base of the lamina;
2. the colour of the fresh leaf;
3. the size of the male inflorescence;
4. the presence or absence of the annulus at the base of the flower-head;
5. the size of the male-flower;
6. the shape of the style-apex;
7. the adherence of the wall and core of the ripe syncarp;
8. the texture and shape of the fruiting perianth;
9. the structure of the fruiting pericarp;
10. the size and attachment of the style in the fruit;
11. the attachment and shape of the seed;
12. the structure of the testa;
13. the dissimilarity of the cotyledons;
14. the position of the radicle.

Between the Jack and Cultivated Chempedak one may also add the hairiness and the shape and smell of the ripe fruit, perhaps also its surface markings, but all these points are annulled by the Wild Chempedak. A strigose shoot therefore indicates the Chempedak, but a glabrous shoot may be either Jack or Chempedak.

PART II, SYSTEMATY

The Identification of Artocarpus integer (Thunbg.) Merrill

1. The basinym of *A. integer* is *Rademachia integra* Thunbg., the original description of which is in Swedish and Latin. The following copy has been sent to me by Professor Svedelius, the Swedish being translated into English:—

> "Description of a new genus, called RADEMACHIA, which has already been depicted and described although incompletely by Rumphius; but now carefully investigated after the new sexual method.
>
> *by* C. P. THUNBERG, M.D.
>
> Act of the Royal Swedish Academy of Science, vol. XXXVII, 1776, p. 254.
>
> 2. sp. *R. integra:* foliis indivisis.
>
> It is called in Malay 'Tjampeda' and the fruit is called Nanca.
>
> *Saccus* arboreus major s. Nanca or Soorzak-boom; Rumph. Herb. Amboin. tom. I. p. 104. tab. 30.
>
> *Saccus* arboreus minor s. Tsjampadaha, Rumph. Herbar. Amb. tom. I. p. 107. tab. 31.

It grows in Java, around Batavia, in Amboina and other places. The root, the stem, the branches and the flowers in this species just as in the foregoing one (= *R. incisa*).

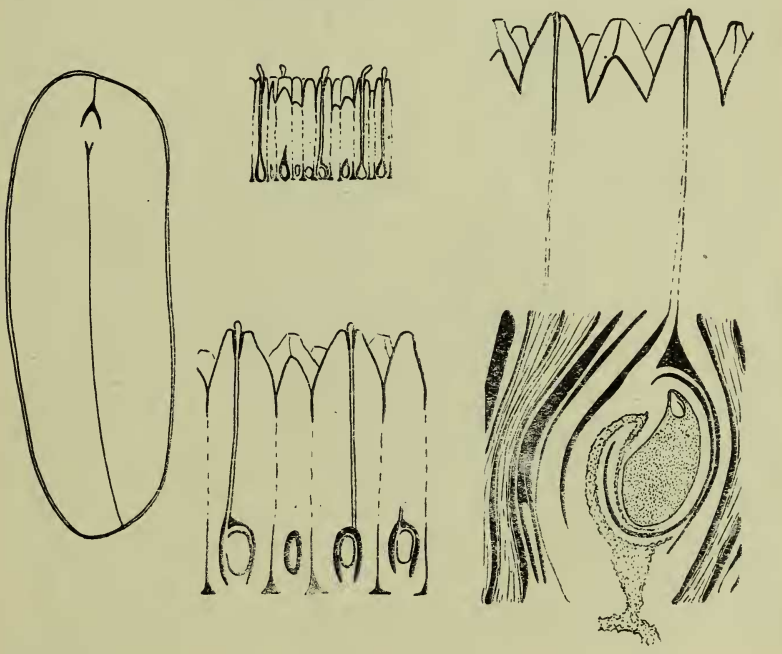
Folia alterna, petiolata, ovato-oblonga, *obtusa cum acumine obtuso*, integerrima, indivisa, nervosa; supra læte viridia, lævissima; subtus pallidiora, *pilis rigidis hirsuta, patentia, spithamaea. Petiolus* subtriqueter, glaber pollicaris.

Ramuli pilis longis rigidis hirsuti, uti etiam pedunculi. *Stipulae*, ut in priori. (= *R. incisa*).

Batavia, d. 15 Junii 1775."

The important points to note in the description are "Folia ..... supra laete viridia ..... subtus pilis rigidis hirsuta, patentia, spithamaea" and "Ramuli pilis longis rigidis hirsuti, uti etiam pedunculi", also the localities Java and Amboina.

From the description one may deduce *a*, that Thunberg collected specimens of Chempedak on his expedition to Java; *b*, that he drew up his description from these specimens in Batavia, most probably from living specimens; *c*, that his description is in no way a copy of the Rumphian, because



TEXT-FIG. 5.

Three stages in the development of the **Jack**-fruit, the youngest at anthesis, the oldest with the embryo-sac (stippled) containing the young embryo and supplied by a stout vascular bundle (speckled). *left* a mature seed of the **Wild Chempedak** (Sing. F. No. 32988) all x 2.

he limits it to the vegetative characters noted by himself; *d,* that he mistook the fruit of the Jack (nanca) for that of the Chempedak and, therefore, *e,* he quoted both *Soccus arboreus major* and *minor* of Rumphius as synonyms of the Javanese Chempedak; *f,* Amboina was given as the Rumphian locality.

The description indicates the Chempedak, not the Jack, and this interpretation is born out by Thunberg's type-specimen.

2. *The Type-Specimen.*—The following extract from Professor Svedelius' letter, together with the two photographs of the type-specimen sent by him and reproduced in Plates 1 and 2, will speak for itself. The decurrent leaf-base of the Jack, the pointed blade of the Chempedak, the hairiness of the latter and the annulus on the male inflorescence of the former can be seen in the photographs.

> "If we now examine the type-specimen of Thunberg's *Rademachia integra* in herb. Thunberg, it will soon be obvious that on the herbarium-sheet *both your species have been fixed together* [*viz.* Chempedak and Jack]. I send you a photographic copy of the whole sheet. From this it is clear that *a* and *b* exactly correspond with Thunberg's description of *Rademachia integra.* They are the type of *R. integra.* It is quite evident that both *a* and *b* (the male receptacle) have the long stiff yellow hairs so characteristic for the Chempedak, further the peduncle (male) is not dilated [*i.e.* without an annulus]. The leaf of *a* corresponds also very well with the leaves of the Chempedak which you have sent us. *c–e* on the other hand must belong to the jack-fruit. Especially *d* and *e* show that the male receptacles are quite different from *a* and *b.* Also their leaves correspond with those of the jack-fruit. Thus these two plants have been fixed together on the same herbarium sheet. In former times botanists were not so careful regarding labels and especially not regarding collecting localities. Thunberg apparently collected *R. integra* in Java and Amboina (Cfr Thunberg *1781* p. 412). In his collections he had also the jack-fruit from Ceylon, but in his first description of *R. integra* (*1776*) he does not quote Ceylon as a locality. Later, many years after Thunberg came home, he had all his collections from South Africa, Ceylon, Netherlands Indies and Japan mounted for the herbarium and probably a mistake was then made and a piece of the Chempedak from Batavia was fixed together with the jack-fruit from Ceylon on the same paper. Thunberg had namely made a note on the back of the herbarium-sheet "e Ceylona Thunberg". There, probably, Chempedak does not occur.
>
> The type-specimen *a* and *b* clearly correspond with Thunberg's description of *Rademachia integra* (*Sitodium macrocarpon*) "pilis longis hirsuti" and Thunberg quotes the Malay name Tsjampedaha! Thus you are quite right if you say that the Chempedak must be named *Artocarpus integra* (Thunb.)."

The Ceylon-specimens of the Jack cannot be considered as part of the type of *R. integra* because Ceylon was not mentioned as a locality in the original description, and

Thunberg's specimens of **Chempedak** and **Jack**
a, b, *Radermachia integra* Thunb. [=*Artocarpus integrifolia* (Thunb.) Linn f.], the **Chempedak:**
c, d, e, *Artocarpus integra* auctt. (=*A. heterophyllus* Lam.), the **Jack.**
(from Thunberg's herbarium, by courtesy of Professor N. E. Svedelius, Botanical Institute, Uppsala).

Part of Plate 1, enlarged: the **type** of the **Chempedak.**

Thunberg would not have made this omission if he had already collected specimens there himself. It was not until his later paper on Sitodium *1779 (vide infra)* that he added Ceylon and thoroughly confused both species.

3. *Conclusion.*—I agree with the following extract from Professor Svedelius' letter:—

> "That the herbarium-sheet with the two species together cannot force us to give the name 'integra' or 'integrifolia' to the jack-fruit clearly appears from the very clear description of Thunberg and also Linné fil. The diagnosis speaks for the Chempedak and when also the original of Thunberg's *Rademachia integra* shows the same it seems to me that you are quite right when you give a name to the jack-fruit and reserve the old species name '*integra*' for the Chempedak."

In other words the correct name for the Chempedak is *A. integer* (Thunb.). The combination has already been made by Merrill in the belief that he was dealing with the Jack. The full botanical title of the Chempedak must therefore be:—

Artocarpus integer (Thunb.) Merrill non sensu Merrill, Interpr. Rumph. Herb. Amboin. *1917*, p. 190.

Synonyms of the Chempedak

Artocarpus integrifolia Linn. f., Suppl. *1781*, p. 412.

Sitodium macrocarpon Thunb., Phil. Tr. Roy. Soc. LXIX, *1779*, pt. 2, pp. 467–473.

Sitodium cauliflorum Gaertner, Fruct. Sem. Plant. *1788*, vol. 1 p. 345; vol. 3, t. 71, 72.

Artocarpus Jaca Lam., Enc. Meth. Bot. III, *1789*, p. 209, t. 745.

(*Soccus arborcus minor* Rumph., Herb. Amboin., tom. 1, p. 107, t. 31).

Artocarpus integrifolia Linn. f.

The description is merely an abbreviation of Thunberg's for *R. integra*, which name is cited as a synonym. According to the International Botanical Rules of Nomenclature *1935* Art. 60 (1) as emended at the 6th International Botanical Congress in *1935*, *A. integrifolia* is a superfluous, and therefore illegitimate, name. The following extract from Prof. Svedelius' letter confirms this opinion:—

> "The type-specimen of *Artocarpus integrifolia* L. fil., described by the younger Linnæus (filius) 1781, probably does not exist if it is not the specimen in herb. Thunberg. If it belonged to the Linnæan herbarium it ought to be in the Linnæan Herbarium in London. Dr. B. D. Jackson however in his Index to the Linnæan Herbarium (London *1912*) mentions only one species of Artocarpus *viz. A. lobatus* L.f. (1087) but no Rademachia and no Sitodium..... Note that Linnæus fil. here [*i.e.* in his description of *A. integrifolia*] only mentions Java and Amboina as home!"

It is clear therefore that Thunberg's Ceylon-specimen of the Jack did not enter even into *A. integrifolia,* which is solely the Chempedak except for the reference to the Rumphian *Soccus arboreus major:* not even the name 'nanca' is mentioned.

Sitodium macrocarpon Thunb.

In this year Thunberg altered Rademachia (now spelt Radermachia) to Sitodium, evidently on the instance of Banks, as Rademachia was pre-occupied. Under *S. macrocarpon* Thunberg gave *R. integra* as a synonym; therefore, *S. macrocarpon* is also a superfluous name (Intern. Bot. Rules *1935* Art. 60, 1). The description is extended and muddled by the attribution of the fruit of the Jack to the foliage of the Chempedak. Ceylon and India were given as localities. 'Jacca' and 'Nanca' were given as vernacular names and Rheede's Tsjakamaram (Hort. Mal. 111, p. 17), which is unquestionably the Jack, was given as a synonym. The 'Observationes', on pp. 471–473, show how thoroughly Thunberg had now confused the species. As Professor Svedelius remarks, it must have been after this date the Ceylon-specimens of the Jack were fixed to the same sheet as the specimens of Chempedak from Batavia.

Sitodium cauliflorum Gaertner.

This synonym provides an instance of the awkward retrospective action of the Rules of Botanical Nomenclature. As a synonym of *S. cauliflorum,* Gaertner gave "Artocarpus foliis integris Linn. Syst. Veg. 838": the number 838 refers to the page in J. A. Murray's edition (*1784*) of Linnaeus' work. From the remarks at the foot of page 345, Gaertner intended *A. integrifolia* L.f. as a synonym. *S. cauliflorum* therefore covers the type of *A. integrifolia* L.f., which has *R. integra* as its basinym. *S. cauliflorum* must therefore be treated as another superfluous name for the *Chempedak* and so, nomenclaturally, illegitimate. Though his description and figure represent only the Jack, Gaertner did not distinguish it from the Chempedak, c.f. his Rumphian citations, and he was evidently no better informed in this respect than his contemporaries.

Artocarpus jaca Lam.

According to the same Article of the Rules and in spite of the fact that Lamarck was the first of the post-Linnean authors to discern some difference between the Chempedak and the Jack, *A. jaca* must also be treated as a superfluous name *for the Chempedak* though intended primarily for the Jack. Lamarck realised that *Soccus arboreus minor, R. integra* and *A. integrifolia* differed from the Jack in being hairy and accordingly made them "La variété B"

of *A. jaca.* He thereby instated an invalid pre-Linnean epithet (from *Iridaps Jaca* Commerson) for that of the valid *R. integra.* According to the Rules in retrospect, Lamarck should have made the glabrous Jack a variety of the hairy *R. integra* and should have made the new combination *A. integra* (Thunb.) with a variety *jaca.* If one considers that the Rules deal hardly with Lamarck in this case, it cannot be denied that he profits undeservingly by them with his contemporary name *A. heterophyllus* which, devised in ignorance, becomes the legitimate name for the Jack.

Polyphema Champeden

Polyphema Champeden Loureiro, Fl. Cochinch. *1790,* p. 547.

= *Artocarpus Champeden* (Lour.) Spreng., Syst. 3, *1826,* p. 804.

A. Polyphema Pers., Syn. *1807,* II, 531.

This species has always been interpreted as the Malayan Chempedak, the most recent affirmation being Merrill's (Comm. Lour. Fl. Cochinch., Tr. Am. Phil. Soc. XXIV, *1935,* pt. 2, 135). It seems to me, however, that its identity has by no means been solved and that Merrill's interpretation lacks proof. My own opinion is that *P. Champeden* is a 'mixtum compositum' for the following reasons:—

1. The description embraces plants from three sources:—

   a, Cochinchina:—"Habitat in altis sylvis Cochinchinae": Loureiro lived in Cochinchina: his book is a Flora of Cochinchina: he quotes a Cochinchinese vernacular name.

   b, Malacca:—"circa fretum Malaccense habitantibus",

   c, Amboina:—in quoting *Soccus arboreus minor* of Rumphius.

2. Nevertheless, Merrill says that "Loureiro's description was based on plants observed by him near Malacca ....." and that there is a specimen of Loureiro's at the British Museum. Such a specimen was not mentioned by Spencer Moore in his investigation of Loureiro's types (Journ. Bot. *1925,* p. 245.). Mr. Taylor tells me that he has been unable to find the specimen and that there is no mark against the species in the British Museum's copy of Loureiro's Flora to show that it was received. Merrill's contention thus appears groundless; and the interpretation of *P. Champeden* from a Malaccan species is out of the

question. To me it is obvious that Loureiro identified plants that were familiar to him as 'cây mit nai' in Cochinchina with *Soccus arboreus minor* of Rumphius and, perhaps, with trees of Chempedak that he had seen or had heard of in Malacca, and that, in deference to the priority of Rumphius, which was then acknowledged, he mistakenly applied the name 'Champeden' to the Cochinchinese species. Manifestly Loureiro described his species from Cochinchinese plants.

3. If one interprets Loureiro's species as the Malayan Chempedak, then according to Gagnepain (Fl. Gen. Indoch. v, *1928,* 734) it does not grow in Indochina where Loureiro said it did.

4. If Loureiro's species is the Malayan Chempedak, it should have been characteristically hairy but all that Loureiro said was "foliis ..... pilosis, rugosis, sparsis" and, whatever such words may mean, they were obviously borrowed from Rumphius (see 6, below). The hairiness of the petiole, peduncle, twigs and buds would not have escaped so acute an observer as Loureiro. This discrepancy convinces me that at the time of writing his description of *P. Champeden,* Loureiro had only specimens of a Cochinchinese species which he wrongly identified with the Chempedak, that he borrowed from the description of *Soccus arboreus minor,* and that in his misapplication he overlooked the most obvious character of the cultivated Malayan Chempedak.

Moreover, in his 'Observatio' under the preceding species, *P. jaca,* Loureiro said that both *P. jaca* and *P. Champeden* had *not* "pedunculi pilis longis hirsuti", which are the words used by Linnaeus fil. (and Thunberg) in describing the type-specimen of Chempedak as *A. integrifolia.*

5. Loureiro wrote of the inflorescence-heads of *P. Champeden* "Amenta oblongo-ovata" and in the 'Observatio' under the preceding species, *P. jaca,* remarked that he had never seen the "amentum cylindricum" described for *Artocarpus integrifolia,* quoting this as one of his reasons for doubting the identity of Artocarpus and Polyphema. Now the Chempedak has 'amentum cyclindricum', as Thunberg's specimen displays. How then can it be *P. Champeden?*

6. Parts of Loureiro's description are copied from Rumphius' description of *Soccus arboreus minor.* A genuine description would have had the freedom of Thunberg's. Thus:—

> "Folia ..... rugosa, pilosa, superius obscuro-viridia, subtus flavescentia" (= "folia ..... superius obscure virentia, inferius flava ..... rugosa et pilosa" Rumphius).

"baccæ vix pedem longe, 4 pollius latæ, flavo-virides (= "fructus ..... pede nempe modo longus, quatuor vel quinque crassus digitos ..... Exterior flavo-viridis ....." Rumphius).

Thus far Loureiro undoubtedly described the Malayan Chempedak as copied from Rumphius. Paragraphs 4 and 5, above, show that he also meant some other plant.

7. I conclude that *P. Champeden* is an unidentified species "amento oblongo-ovato" from Cochinchina, and that the application of the name to any species of Artocarpus should be withheld until it can be proved to be a Cochinchinese species. The vernacular name 'cây mit nai' is still in use for several species in Indochina (Gagnepain).

I have gone into this matter in some detail in order to show how necessary it is to support with botanical proof identifications, name-changes and reductions, if it is intended that they should be accepted by botanists. There has been as much confusion over *P. Champeden* as over *A. integer* because systematists have been content to copy and cite authority in both cases without botanical verification.

The Wild Chempedak

From its barrel-shaped, inodorous syncarps, the almost tasteless pulp round the seeds, the lack of rich autumn-tints in its withering leaves and its natural habitat in the high forest, I consider that the Wild Chempedak should be distinguished as a variety of *A. integer* and I propose for it the name *silvestris*. I have seen sufficient number of trees in different parts of the country to feel assured of the constancy of these characters. May be the shape and large size of the male inflorescence and the larger stamens are distinctive but observations from other trees will be needed to establish these points. In the hairiness of the leaf and twig, and the prominence of the spines on the syncarp there are evidently individual differences among the trees suggesting forms or varieties. One would expect, also, some differences in the taste of the pulp tending toward that of the cultivated Chempedak, of which the wild variety is undoubtedly the ancestor.

The Wild Chempedak has been found only in Malaya. It appears to be not uncommon in the forest from sea-level to moderate altitudes (4,000 ft.) and it is abundant enough in the Tahan Game Reserve in the middle of Pahang, where the wild forms of many of our local fruit-trees are to be found, at least according to the Pahang Malays. The Wild Chempedak begins to fruit when a small tree 30 or 40 ft. high, when it is cauliflorous: old trees, reaching 130 ft., seem to become completely ramiflorous. In general

appearance and from dried specimens of leaf and fruit, it is indistinguishable from the cultivated Chempedak.

A. integer var. **silvestris** var. nov.

Bangkong, Chempedak Utan, Baroh (Johore), Wild Chempedak.

Arbor silvestris, incultus: syncarpiis ellipsoideis vel oblongo-ellipsoideis, inodoris: pulpa seminis subacida, insipida: foliis senescentibus vix lutescentibus.

Collections:—

Wray 1356 (Tapah, Perak), scarcely hairy;
Kunstler 1636 (Penang), hairy; ? cultivated;
Strugnell 14627 (Fraser's Hill, Pahang, ca. 1200 m.), subglabrous;
Ridley s.n. (Tahan River, Pahang), hairy;
Ridley s.n. (Simpang Mines, Selangor), subglabrous;
Ahmad 4586 (Weld Hill, Selangor), subglabrous;
M. Nur 11254 (Fraser's Hill, Pahang, ca. 1500 m.), subglabrous;
Kiah s.n. (S. Kayu, Johore), subglabrous;
Corner 32988 (Johore), glabrous (Type);
Corner 33205 (Fraser's Hill, Pahang, ca. 1200 m.) hairy;
Corner 33688 (K. Teku, Pahang, ca. 300 m.) hairy;
Corner s.n. (S. Tahan, Pahang, 8.9.37) hairy;
Corner s.n. (Fraser's Hill, Pahang, 14.8.37) hairy.

The Botanical Names for the Jack

Artocarpus heterophyllus Lam., Encycl. Meth. Bot. vol. III, *1789,* p. 209.

Syn. *A. philippensis* Lam., ibid. 210; Willd. sp. Pl. 4. *1805,* p. 189.

Polyphema Jaca Lour., Flor. Cochinch. *1790,* p. 546. haud *A. jaca* Lam. (1789).

A. maxima Blanco, Fl. Filip. *1837,* p. 669.

(*Tsjakamaram,* Rheede, Hort. Malab., III, *1682,* t. 26–28).

(*Soccus arboreus major* Rumph., Herb. Amboin., tom. 1, p. 104, t. 30).

I have not seen the type of *A. heterophyllus* but the species has been universally admitted as a synonym of the Jack and Lamarck's description and reference to *Soccus arboreus major* of Rumphius permit no doubt. Lamarck described the annulus at the base of the male inflorescence, which seems not to occur in any other Artocarpus though probably it is morphologically comparable with the bracts of Parartocarpus. *A. heterophyllus* is the first undoubted description of the Jack which does not include *R. integra* Thunbg., and therefore it must be its legitimate botanical name. Lamarck intended his species for the "Nanca" of Rumphius and supposed that the Jack of India was different. The type of the Jack must therefore be Commerson's specimen in Lamarck's Herbarium in Paris,

consisting of the precocious male inflorescences and the sapling leaves of a seedling raised "au Jardin du Roi, à l'Isle de France". Such are the histories of Tropical Botany.

In reducing *A. philippensis* to the Jack, I follow Elmer (Leaflets, II, *1909,* p. 612) and Merrill (Enum. Phil. Pl. II, *1923,* p. 41) though I cannot find that these authors have given any reasons or that anyone has investigated the type. Lamarck distinguished *A. philippensis* by its blunt, retuse obovate leaves, but such leaves are occasionally met with in the Jack, especially if the bud has been damaged. I find commonly that the very blunt, retuse shape of the leaves of many tropical trees is by no means as characteristic as a few specimens might lead one to suppose, but in most cases has been caused by some abnormality in leaf-growth. Lamarck described also a narrow involucral annulus at the base of the male inflorescence of *A. philippensis,* which feature should clinch its identity with the Jack. The type must be Sonnerat's specimen from the Philippines in Lamarck's herbarium at Paris.

A. heterophyllus Lam. and *A. philippensis* Lam. were published simultaneously. In choosing *A. heterophyllus* for the Jack, I have selected the less inappropriate name. Though there seems to be some difference between sapling and adult foliage in nearly all species of Artocarpus, the epithet *philippensis* would be very misleading.

It is true that Willdenow reduced *A. heterophyllus* to *A. integrifolia,* in the belief that *A. integrifolia* was the Jack, and that he retained *A. philippensis,* but it cannot be said that he in any way made a choice between *A. heterophyllus* and *A. philippensis* as synonyms of the Jack. His reduction of *A. heterophyllus* was erroneous. Indeed Willdenow was thoroughly confused because he gave the name *A. integrifolia* to Lamarck's *A. jaca* and also distinguished Lamarck's variety B which was based on *A. integrifolia.* If Willdenow had made a selection between *A. heterophyllus* and *A. philippensis* it should have been as varietal names for his *A. integrifolia* variety γ.

P. Jaca Lour. and *A. maxima* Blanco are generally interpreted as the Jack. The names are unfortunately antedated. There is an original specimen of *P. Jaca* at the British Museum, which Mr. Taylor informs me is the Jack in cultivation in Indochina.

Varieties of the Jack

In Malaya the Jack is remarkably uniform and conforms exactly with the description in Ochse's two works. In Ceylon and, especially India, I understand that there are

many varieties, but precisely how they are to be distinguished seems not to have been stated. It would be well if some Indian botanist were to describe them bearing in view the points of distinction between the Jack and Chempedak which I have enumerated. Thus the two varieties known in Burma as Talaing and Kala seem to differ from the Malayan Jack in having longer, more crowded and blunt spines and the taste of all three is distinctly different.* I wish, however, to draw especial attention to two varieties.

In the first place, there is said to be a variety which bears fruits on the roots. The fruits develop underground and as they swell they raise small mounds which they eventually burst, and thus they disclose themselves. This variety is said by Malays to occur in Malaya, but very rarely, and it was noted also by Thunberg in his observations on *Sitodium macrocarpon* (Phil. Trans. Roy. Soc. vol. LXIX, pt. 11, *1779*, at the top of p. 472). The fruits are said to be exceptionally large and most delicate of flavour—"a duobus servis portari debeant singuli, hique fructus maxime delicati aestimantur". It appears that no botanist has ever seen this variety. The fruits must be developed on adventitious root-suckers.

In the second place, there is said to occur in Ceylon a variety called "Vela" which is "characterised by its softer pulp, through which the finger may be thrust when approaching ripeness" (H. F. Macmillan, Tropical Planting and Gardening, 1935, p. 250). It seems that the plant described by da Costa in India as "Gerissal" is also the same as can be judged from the following quotation:—

> "970—The Jack-fruit has also many varieties, the principal and easily noticeable ones being the BARICA (Borcoi or Capo) and GERISSAL (Ponosso or Rossal). The Barica-fruit is firm and hard, and its pods (pips) are easily detached entire and can be cut into small pieces. The Gerissal is soft, and its pips are so soft (branda) and juicy that they cannot be cut into pieces and hence they are put entire into the mouth. It might be doubted whether these two kinds of plants are really two species or two varieties of the same species, so great are the noticeable external differences: but if the common opinion is true that the Barica-seed, when sown, gives Gerissal-plants and *vice-versa*—an opinion also affirmed in the ARTE PALMARICA 44, but which I have not verified—then it is clear that these two kinds of plants are varieties and not two species .....
>
> 971—Under each of these two varieties there are many subvarieties which differ in taste, colour, fibrousness and

* I am indebted to J. W. Grant, M.A., B.Sc., I.A.S., Rice Research Officer, Burma, for kindly sending me fresh specimens of both varieties. (Dept. Agric., Burma, Bulletin No. 30, *1936*, p. 57, J. W. Grant and A. N. P. Williams).

sweetness of their pips. However, unlike the subvarieties of Mangoes, none of these subvarieties has received any particular name, a fact which might be attributable to the lack of demand, ability or knowledge on the part of the farmer to perpetuate the varieties by artificial propagation". (Manual Practico do Agricultor Indiano, vol. 2, *1874*, p. 148).

The "Vela" and "Gerissal" suggest a variety of the Chempedak which is glabrous, like some forms of the Wild Chempedak in Malaya, but possessed of better flavour. So far as I can ascertain, there is no record of the Chempedak from India or Ceylon, but if the hairy Malayan Chempedak has been confused with the Jack, how much more may not a glabrous variety be? Mr. Furtado informs me that he remembers in the neighbourhood of Goa two varieties of Jack, one with the firm fruit, firm pulp and crinkly seed of the Jack proper and the other with the soft baggy fruit, the soft pulp and almost testa-less seed of the Chempedak, but that both kinds were glabrous: in fact he did not associate hairiness with the character of the Chempedak until he met with it in Malaya. I would ask, therefore, the botanists in Southern India to investigate the cultivated Jack to see whether some varieties may not really belong to the Chempedak. My request for specimens of "Vela" from the Department of Agriculture in Ceylon met, unfortunately, with no response.

Specimens of 'Koolai' and 'Varika', sent by Mr. Broadfoot from Coimbatore, have proved to be varieties of Jack. So also have the 'Talaing' and 'Kala' of Burma but the Burmese 'Sone-ka-dat' from Moulmein is the cultivated Chempedak. For the discovery of this fact, which becomes the first record of the Chempedak north of the Malay Peninsula, I am indebted to Mr. Grant who suggested the possibility to me in a letter.

The Confusion of Jack and Chempedak

The specificity of each was fully grasped by Rumphius in whose excellent descriptions of *Soccus arboreus major* and *S. a. minor,* written in the 17th century, the main distinctions were clearly stated. It is doubtful if Thunberg realised that he was dealing with two species, although his first attempt with *Rademachia integra* was fortunately precise. His second attempt, with *Sitodium macrocarpon,* was confused. Gaertner, evidently, knew only the Jack. Lamarck perceived some discrepancy between *Soccus arboreus minor* and *R. integra,* on the one hand, and the Jack on the other hand, but he believed that the "Nanka" or *Soccus arboreus major* of Rumphius was yet another

species. Loureiro distinguished a second species from the Jack, ascribing to it the Rumphian *Soccus arboreus minor* and the Malayan Chempedak as well as a Cochinchinese species, but what this latter was has not been ascertained. Because Loureiro gave the name Champeden to his species, botanists subsequently identified the Malayan Chempedak as *Artocarpus Champeden* (Lour.) Spreng. without enquiring into its exact nature and this error has been copied to the present day. The very accurate figure and description of the Jack, as *Artocarpus integrifolia,* by W. J. Hooker (in Curtis' Bot. Mag. vol. LV. *1828,* t. 2833, 2834), written in ignorance of the Chempedak, contributed probably to the greatest extent in perpetuating the error. Sprengel, Persoon and Willdenow were merely copyists. But if King had not omitted, for some unaccountable reason, the Jack from his monograph of "Artocarpus in British India" (Ann. R. Bot. Gard. Calc. II, *1889*), these nomenclatorial researches of mine would undoubtedly have been unnecessary.

A. integer as a nomen specificum conservandum

I find that it has been proposed by Indian foresters to conserve the name *A. integer,* or *A. integrifolia,* for the Jack of India. Hitherto the conservation of specific names has been discountenanced at Botanical Congresses, and the present instance shows what a dangerous precedent it may create. The confusion between Jack and Chempedak can be ascribed only to the incompetence of systematists and their lack of acquaintance with the plants which they have tried to classify. Nor have any practical men, so far as I can ascertain, endeavoured to assist systematists in this actual instance. The conservation of specific names can be accepted only if botanists agree to forego entirely their principles of priority and typification, in other words to throw over their system of nomenclature, and to adopt arbitrary names for every species. And supposing such, what is *A. integer* of India, the Chempedak or the Jack, because both species evidently grow there and have been mistaken for each other? Let us rather acknowledge the ignorance that still prevails concerning the systematy of tropical plants and direct our efforts to overcome this. I find that confusion in botanical names is always accompanied by a confusion in practice, for it is not merely wrong identification that is at the bottom of the grievance but an acute lack of knowledge. It is time, surely, that tropical systematy was removed from the "hortus siccus" to its rightful place in the Botanic Gardens of the tropics.

Summary

By reference to the original description and type-specimen of *Rademachia integra* Thunbg., I have shown that the combination *Artocarpus integer* (Thunbg.) Merrill, published in *1917,* as the legitimate botanical name for the Jack, is really another species called the Chempedak. The Jack must, therefore, be called by its earliest legitimate synonym which is *Artocarpus heterophyllus* Lamarck (*1789*).

The type-specimen of *A. integer* is in Thunberg's herbarium at Uppsala. The type of *A. heterophyllus* is in Lamarck's herbarium in Paris.

I have contrasted in detail the macroscopic characters of the Jack and the Chempedak in both its cultivated and wild states. The species differ in some two dozen features, the most important of which concern the base of the leaf-blade, the base of the inflorescence-head and the structure of the syncarp, true-fruit and seed.

The two species were much confused by the early botanists and it seems that they still are confused in Southern India. The Sone-ka-dat of Burma is the Chempedak.

It is much to be desired that the status of the Indian Jack in all its varieties should be thoroughly examined.

The Wild Chempedak of Malaya is distinguished as *A. integer* var. *silvestris* var. nov., chiefly on account of its broad inodorous fruits, the insipid pulp round its seeds and its wild habitat.

The synonymy of the two species I have discussed with the conclusion that *Artocarpus Champeden* (Lour.) Spreng. must be a Cochinchinese species different from the Chempedak and one that has not been recognised again. It seems to have been as much misinterpreted as *A. integer.*

The objection to *nomina specifica conservanda* is discussed.